

Final Management Plan

EA ID-074-02-067

Finding of No Significant Impact

INEEL Sagebrush Steppe Ecosystem Reserve

May 2004



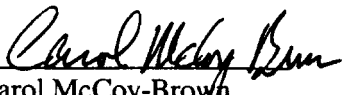
Finding of No Significant Impact/Decision Record

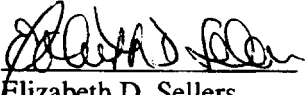
Decision: It is our decision to implement the Proposed Action as described in Section 2.2 of the Environmental Assessment (EA), with the modifications of allowing for voluntary relinquishment of grazing preference as analyzed in Alternative 3, and the additions contained in the Addendum. The management actions selected present a compromise between protecting the valuable natural resources present on the Reserve and allowing for continuation of authorized uses while achieving the Management Goals and Objectives for the Reserve contained in Section 1.2 of the EA. The decision to proceed with the modified proposed action does not result in any unnecessary or undue environmental degradation and is in conformance with the designation of the INEEL as a National Environmental Research Park in 1975.

Implementation and Administration: The decision will be implemented and administered jointly by the Bureau of Land Management (BLM) and U.S. Department of Energy (DOE) in consultation with the U.S. Fish and Wildlife Service and Idaho Department of Fish and Game. The Reserve Management Committee, as described in Section 2.1 of the environmental assessment, is responsible for overall coordination of activities conducted within the Reserve and recommending how resources should be allocated to best meet the objectives of the Reserve. Based on the decision to implement the proposed action and in accordance with Public Land Orders 1770 and 637, the BLM, Idaho Falls Field Office, will administer and enforce the grazing permits and implement range improvements for the involved grazing allotments. In accordance with the Public Land Orders, DOE will control all access to the reserve, which is within the boundaries of the Idaho National Engineering and Environmental Laboratory (INEEL), and provide services as necessary, such as use of existing vehicle washing stations and weed management. Both agencies will take action as necessary, and provide resources to implement the decision and prevent the evolution of conditions that may lead to a significant environmental impact within the meaning of NEPA. The significance criteria, which this finding of no significant impact/decision record is based upon, are listed at 40 CFR 1508.27.

Finding of No Significant Impact: In accordance with the National Environmental Policy Act and the implementing regulations of the Council of Environmental Quality contained in 40 CFR 1500-1508, we find that the modified proposed action, implemented and managed as analyzed in the attached environmental assessment, is not a major federal action significantly affecting the quality of the human environment. Therefore, no Environmental Impact Statement will be prepared.

Compliance and Monitoring: Within 60 calendar days of the date of this decision, BLM and DOE will convene the Sagebrush Steppe Ecosystem Long-Term Management Committee described in the environmental assessment. The Committee will be initially chaired by the BLM representative. Among its other responsibilities, the committee will be charged with development of Implementation and Monitoring plans for the Reserve which will be used to direct future management to achieve Management Goals and Objectives.


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4/27/04
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ACRONYMS

AUM	Animal Unit Month
BLM	U.S. Department of Interior, Bureau of Land Management
CEQ	Council on Environmental Quality
CFA	Central Facilities Area
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy at INEEL
EA	Environmental Assessment
ESA	Endangered Species Act
FWS	U.S. Department of Interior, Fish and Wildlife Service
GIS	Geographic Information Systems
INEEL	Idaho National Environmental and Engineering Laboratory
IDF&G	Idaho Department of Fish and Game
IWM	Integrated Weed Management
MIST	Minimum Impact Fire Suppression Tactics
NEPA	National Environmental Policy Act (1970)
NERP	National Environmental Research Park
ROW	Right of Way
TAN	Test Area North
USGS	U.S. Department of Interior, Geological Survey
WRRTF	Water Reactor Research Test Facility

ADDENDUM

After consideration of public comments, the EA has been modified with addition of the following sections pertaining to predator and insect control programs. Chapters 2, 3, and 4 are modified with the following sections as labeled.

In addition, several editorial changes have been made within the document . These were not substantial and are shown in bold print and underlined.

Modifications to Chapter 2—Management Alternatives for Insect and Predator Control

Alternative 1 (The Proposed Action)

Insect and predator control actions would be considered on the Reserve on a case-by-case basis and would be allowed only if consistent with the Reserve Management Objectives and no other options were available to address resource issues. Guidance contained in the PLOs limits predator control to lands covered by PLO 1770.

Alternative 2 (No Action)

Predator control currently may be conducted only on lands covered PLO 1770. This covers approximately 16,600 acres (23 %) of the Reserve. Insect control is done through interagency cooperation with other interested agencies including USDA, Animal and Plant Health Inspection Service (APHIS), and the BLM. To date, insect control measures have never been conducted on the INEEL.

Alternative 3 (Emphasize Natural Resource Protection)

No insect or predator control would be considered on the Reserve.

Alternative 4 (Emphasize opportunity for Resource Development)

Continue management as under Alternative 2

Modifications to Chapter 3—Affected Environment

Insects

The Reserve contains a wide variety of native insects common in sagebrush steppe habitats, but no extensive inventory has been completed. Since the 1980s, grasshopper outbreaks in the region have included the species *Melanoplus sanguinipes*, *Camnula pellucida*, *Aulocara* and *Oedaleonotus enigma* (APHIS, 2003). Of these, only *Melanoplus sanguinipes* has been identified on the INEEL (Stafford, 1987). Mormon crickets (*Anabrus simplex*) have not been identified on the INEEL, but probably occur at some level. None of the invertebrate species known on the INEEL are special status species.

Predators

The grey wolf has not been documented on the Reserve, but could reach the area through dispersion from established packs to the north. This species is listed as an experimental/non-essential population and problem individuals could be pursued by Wildlife Services.

Coyotes, usually the primary target of Wildlife Services control efforts, are common on the Reserve. This species is listed as a Culturally Significant Species by the Shoshone-Bannock Tribes.

Raptors documented on the Reserve include the listed (threatened) bald eagle, ferruginous hawk (a species of concern), and the Culturally Significant Species, golden eagles and red tailed hawks. Wildlife Services does not control raptors on rangelands.

Modifications to Chapter 4—Environmental Consequences

4.3 Effects of Alternatives on Native Plant Communities, Wildlife Habitat, Soils and Air Quality, Social and Economic Resources

Management Considerations

Control of grasshopper and Mormon cricket outbreaks on rangelands is mandated under Section 417 of the Plant Protection Act of 2000 (7 USC 7717). Control of these insects is conducted by the USDA, Animal and Plant Health Inspection Service (APHIS). Environmental compliance with NEPA for insect control programs is accomplished through annual environmental assessments. The current EA is the Site-Specific Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program, Idaho: ID-PPQ-GH2003-001 (APHIS, 2003). This document analyzes alternative control methods, insecticides available and the environmental risks of each, and may be found at www.agri.state.id.us/plants/GHOTOC.htm.

By Memorandum of Understanding (MOU) dated March 20, 2003, the INEEL and BLM agree to cooperate with other interested agencies, including APHIS, in controlling insects on the INEEL and adjacent lands. Insect control programs are conducted at the request of individual agencies or the Idaho Department of Agriculture when grasshopper or Mormon cricket populations increase dramatically to reach an economically or environmentally critical level. A general rule of thumb of 8 grasshoppers or 3 Mormon crickets per square yard is considered the threshold for critical level of infestation. Grasshopper suppression programs on BLM land are primarily for crop protection where private lands are in close proximity to public lands.

Grasshopper control was last implemented in the area near Howe in the 1980s and no insect control programs have been conducted on the INEEL. However, the proximity of croplands to the INEEL near Mud Lake increases slightly the possibility that control actions could be considered in the future.

Predator control across the Snake River Plain is conducted by APHIS Wildlife Services (WS) in accordance with the EA Predator Damage Management in Southern Idaho, April 16, 2002. WS conducts predator control on public lands administered by the BLM under a MOU between the BLM and APHIS dated March 21, 1995. A second MOU between BLM and INEEL dated March 20, 2003 extends the APHIS predator control measures to the portions of the INEEL covered by PLO 1770, covering approximately 1/3 of the Reserve. Approved control methods under the EA include traps, snares, calling/shooting, M-44, denning, dogs, aerial hunting, and potentially DRC-1339. Approved non-lethal methods include scare devices, guard animals, husbandry practices, herd dogs, etc. Methods are used as selectively as possible to minimize the impact to non-target species.

Wildlife Services implements predator control actions following requests for assistance, when and where there is a demonstrated need, and after a careful review of available evidence. They have utilized leg-hold traps, calling/shooting and aerial hunting on the INEEL in the past, generally in response to requests from livestock operators. Recent predator control on the Reserve has been limited to removal of between 5 and 10 coyotes per year through aerial hunting.

Sagebrush Steppe Ecosystem Reserve Management Objective 2e: States: “Adjust all activities as necessary to protect native plant communities, native wildlife habitat, and cultural and tribal resources.” Both insect and predator control on the Reserve could have a wide range of effects on native wildlife and their habitat. Spraying of some insecticides may affect many non-target flora and fauna species and the wildlife that depend upon them for food. Insects significant to many of the biological functions the Sagebrush Steppe ecosystem. They are particularly important for nutrient cycling and as links in many food chains. While control projects would be an unnatural perturbation on wildlife populations and food chains, it is not possible to predict future needs for management actions. It is possible that insect control may be necessary to “protect native plant communities” or that predator control be considered to “protect native wildlife habitat.”

Effects of Alternative 1:

Insect and Predator Control: Management objectives for the Reserve calling for protection of native wildlife habitat would disallow most proposals for control. Case-by-case evaluation of proposals in light of the Management Objectives and consideration of alternative solutions would minimize the potential for damage to the unique resources of the Reserve. Some control actions could be implemented.

Effects of Alternative 2:

Insect and Predator Control: With no previous insect and very limited predator control history, there have been essentially no effects on the resources on the Reserve. Under current guidance for both of these programs, both grasshopper spraying and predator control could be carried out as allowed by state level guidance for public lands. This guidance does not consider the Management Objectives of the Reserve.

Effects of Alternative 3:

Insect and Predator Control: Removing all potential for insect or predator control on the Reserve would probably have little effect. In the remote chance that grasshopper or coyote populations were to increase dramatically, there would be no opportunity to limit potential damage to Reserve resources or to adjacent private croplands.

Effects of Alternative 4:

Insect and Predator Control: With no previous insect and very limited predator control history, there have been essentially no effects on the resources on the Reserve. Under current guidance for both of these programs, both grasshopper spraying and predator control could be carried out as allowed by state level guidance for public lands. This guidance does not consider the Management Objectives of the Reserve. These effects are the same as under alternative 2.

4.8 Cumulative Impacts

Insect and predator control are conducted as necessary on essentially all other lands in the Snake River plane. Any limitations on these actions which may be placed by the Reserve long-Term Management Committee would have little effect on regional insect or predator populations. There is a small potential for the Reserve to become a refuge or source for these problem species, but retention of the potential for control under the proposed action would allow for emergency control actions should they become necessary.

Additional References Cited

APHIS. 2003. *Site-Specific Environmental Assessment Rangeland Grasshopper and Mormon Cricket Suppression Program. Idaho: ID-PPQ-GH2003-001*. USDA, Animal and Plant Health Inspection Service. March, 2003. www.agri.state.id.us/plants/GHOTOc.htm.

Stafford, Michael P. 1987. Insect Interactions with Four Species of Sagebrush (*Artemisia*) in Southeastern Idaho. Doctorial dissertation, University of Idaho.

INEEL Sagebrush Steppe Ecosystem Reserve

Final Management Plan

1. INTRODUCTION

The Idaho National Engineering and Environmental Laboratory Sagebrush Steppe Ecosystem Reserve (Reserve) was established in 1999 by the then Secretary of Energy, William Richardson. In the establishing Proclamation for the Reserve, the Secretary recognized that the “*Reserve is a valuable ecological resource unique to the intermountain west and contains lands that have had little human contact for over 50 years. The Sagebrush Steppe Ecosystem across its entire range was listed as a critically endangered ecosystem by the National Biological Service in 1995, having experienced greater than a 98% decline since European Settlement....Conservation management in this area is intended to maintain the current plant community and provide the opportunity for study of an undisturbed sagebrush steppe ecosystem...Traditional rangeland uses, which currently exist on a portion of the area, will be allowed to continue under this management designation.*” This proclamation was co-signed by representatives of the Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (FWS), U.S. Department of Energy (DOE-ID) and Idaho Department of Fish and Game (IDFG). The Reserve location is shown in Map 1 and the complete proclamation is contained in Appendix 1.

Approximately 40% of the 890 square miles of the Idaho National Engineering and Environmental Laboratory (INEEL) has not been grazed by livestock for the past 50 years, with the balance receiving minimal human influence during that time. This has allowed plant communities to develop into conditions that approximate those that existed prior to European settlement. This is the largest non-grazed reserve of sagebrush steppe in the region, once the most extensive semi-desert vegetation type of the Intermountain West (West, 1988). Recognition of the importance of these communities also resulted in designation of the INEEL as the second of the DOE’s National Environmental Research Parks (NERPs) in 1975. This area offers research opportunities rarely found elsewhere.

While the Reserve contains significant natural resource values, management for protection of these remains secondary to the primary mission of the INEEL. The Public Land Orders (PLOs) which withdrew the INEEL lands specify that nuclear energy research remain the primary use of the INEEL and the area designated as the Reserve could be taken for these uses.

This document has been produced by an interdisciplinary team representing DOE-ID, Bechtel-BWXT, FWS, IDFG, the Shoshone Bannock Tribes and BLM, with funding provided primarily by the DOE.

1.1 Purpose and Need

The purpose of this Environmental Assessment is to: (1) Develop resource specific goals and objectives based upon the broad objectives set forth in the Proclamation, (2) meet the requirements of the National Environmental Policy Act by developing and analyzing alternative management scenarios for achieving those goals and objectives, and (3) establish mechanisms for long-term management of the Reserve.

Throughout the Intermountain Region, low elevation sagebrush steppe communities have, and are being, widely degraded or converted to other uses such as farmlands, grasslands, urban areas and highways. In addition, spread of annual grasses and concurrent changes of fire regimes are threatening

remaining communities. Approximately 1% of historic sagebrush communities in the west remain relatively unchanged from their pre-European settlement condition (Hironaka et al., 1983; Quigley and Arbelbide, 1997; Noss et al., 1995; West, 1999) and populations of wildlife species dependent upon them are declining. The declines in sage grouse and other sagebrush obligate wildlife species have focused attention on the need for protection of remaining intact habitat necessary for species survival. Opportunities to conduct research within minimally altered sagebrush communities may be critical to the survival of many of these species.

1.2 Management Goals and Objectives

The following were developed from the general guidance contained in the Proclamation. These are intended to provide a framework for maintaining the long-term health of the increasingly rare resources found on the Reserve.

Mission Statement: The INEEL Sagebrush Steppe Ecosystem Reserve shall be managed as a laboratory where all native ecosystem components, cultural resources and Native American Tribal values are conserved. Management will concentrate on providing opportunities for scientific investigation of the resources present on the Reserve.

Management Goal 1: Maintain and protect existing high quality biological, cultural and tribal resources.

Objective 1a: Establish a baseline of resource data to identify and prioritize immediate needs for management adjustment.

Objective 1b: Collect, review and summarize all existing research and monitoring information.

Objective 1c: By September 2004, identify biological, cultural and tribal resources at risk, and immediate inventory needs.

Objective 1d: By September 2004, identify immediate management adjustments needed for protection of resources at risk.

Management Goal 2: Provide for long-term resource management, plan implementation and development of educational opportunities.

Objective 2a: By September 2004, develop an Implementation Plan for the management provisions identified herein.

Objective 2b: By September 2004, begin identifying funding sources to support implementation of future management actions and plan implementation.

Objective 2c: By September 2005, develop a Monitoring Plan that would address long-term monitoring needs and protocols for all significant resources on the Reserve.

Objective 2d: By September 2005, develop an Educational Outreach and Resource Interpretation plan.

Objective 2e: Adjust all activities on the Reserve to protect native plant communities, native wildlife habitat, and cultural and tribal resources. Achievement will be measured by reductions of invasive plant infestation acreage and numbers of cultural and tribal sites avoided.

Management Goal 3: Restore degraded ecological resources.

Objective 3a: Develop and conduct site-specific restoration plans for those areas identified as needing restoration by September 2006.

Management Goal 4: Facilitate and manage scientific research.

Objective 4a: By September 2004, develop a Research Facilitation and Management Plan for the Reserve.

Objective 4b: By September 2005, catalogue all existing research and resource data.

1.3 Funding and Plan Implementation

Implementation of selected management actions and achievement of the target dates contained in the objectives are heavily dependent upon future funding allocations. The interagency nature of management and regional significance of the Reserve broadens the potential for funding beyond any one of the cooperating agencies. The Sagebrush Steppe Ecosystem Reserve Long Term Management Committee (Reserve Management Committee) would likely be required to develop innovative funding sources to achieve plan implementation in a timely manner.

1.4 Management Issues

During the Spring and Summer of 2002, comment was received from County Commissioners, the Shoshone Bannock Tribal Council and the general public at open houses held at Idaho Falls, Fort Hall, Arco, and Mud Lake. The following issues were identified for consideration during preparation of this management plan, based upon public comment and in-house agency review.

Protection of plant communities and wildlife habitat: Viable wildlife populations are dependent upon maintaining diverse, healthy plant communities, maintaining or improving connectivity within habitats, and improving degraded habitats. Management for protection of these resources may require changes to multiple use activities, access to the Reserve, and fire suppression and reclamation procedures.

Protection of special status plant and wildlife species: Several plant and animal species on the Reserve require special attention for research and management. These species include those listed under the Endangered Species Act (ESA), those on State or Federal Sensitive Species lists, sagebrush obligate species, and species culturally important to Indian Tribes.

Management of livestock grazing: The Reserve contains portions of four BLM grazing allotments important to the local economy. Livestock distribution is controlled by herding of sheep and water placement for cattle. With limited allotment boundary fencing, livestock often trespass onto other allotments and the portions of the Reserve closed to grazing.

Wildfire management: Wildfire has been increasing in the Snake River Plain. While no recent fires have occurred on the Reserve, fire is all but certain in the future **and would remove most sagebrush from any areas burned. While sagebrush steppe ecosystems are adapted to periodic fire, recovery requires fire frequencies much lower than those typical of disturbed ecosystems elsewhere**

in the region. Fires also cause high rates of wind erosion and dust affecting INEEL facilities. A variety of fire suppression tactics are available, some of which may be less effective at stopping fire, but leave smaller impacts to surface resources when used.

Roads: The Reserve contains approximately 259 miles of roads that are available only for DOE-ID authorized uses. Public access to the INEEL is limited to protect site security and public safety. Some areas are open to big game hunting and access across the INEEL to BLM and USFS lands is also allowed. Roads, and their use, can pose numerous conflicts with the management goals of the Reserve.

Air quality: Air quality on the Reserve is most affected by smoke from wildfires and dust produced by wind erosion following fires and other soil disturbance. Most soils are highly susceptible to wind erosion, with very high levels of particulate matter being measured following wildfires.

Invasive, non-native plant species: Invasion by noxious weeds and other invasive plants pose a significant threat to the native ecosystems of the Reserve. While noxious weeds have a large potential for expansion, cheatgrass invasion, with its potential to increase fire frequency, is a large threat. In addition, crested wheatgrass, once seeded for reclamation, is also invading adjacent native plant communities.

1.5 Conformance with Existing Plans and Regulations

Designation of the Reserve is consistent with the 1975 designation of the INEEL as a National Environmental Research Park (NERP). This designation recognized the unique opportunities for research that exist on the protected lands that act as buffers around INEEL facilities. The objectives of the NERPs are to conduct research and educational activities concerning the environmental consequences of energy use and weapons development, educating the public on environmental and ecological issues, and to set aside and characterize research reference areas (DOE, 1994). **The designation is also consistent with the INEEL Long-Term Stewardship Strategic Plan.**

A large body of law applies to management of the various resources on the Reserve. Management actions proposed and conducted will comply with these and any amendments that may come in the future.

2. MANAGEMENT ALTERNATIVES

Section 102 (2)(E) of National Environmental Policy Act (NEPA) states “the Federal Government shall study, develop, and describe appropriate alternatives to the recommended courses of action in any proposal which involves unresolved conflicts considering alternative uses of available resources.” A Proposed Action and three alternatives were designed using the following scenarios:

Alternative 1: (The Proposed Action) The course of action recommended by the interdisciplinary team as the best compromise between protecting ecological resources and allowing for continuation of authorized uses on the Reserve.

Alternative 2: (No Action) The management direction that now exists for the Reserve.

Alternative 3: This alternative was formulated to maximize the protection of natural resource values, choosing the most precautionary measures to protect those values.

Alternative 4: This alternative allows for maximum opportunity for use of the natural resources available for development, as limited by the Goals and Objectives for the Reserve.

2.1 Management Direction Common to all Alternatives

Most natural resource allocations are governed by laws and regulations. For some programs, such as management of species listed under the ESA, Cultural Resources and Native American Tribal Values, these laws allow for no viable management alternatives different from current guidance. Management of Long-Term Stewardship may change from the current situation due to Reserve specific guidance developed in this plan. All action alternatives and environmental effects are the same for these programs. **All management actions implemented on the Reserve will use standard construction practices, meet the requirements of law and use state-of-the-art methodology current at the time of implementation.**

Roads

Access for all research projects would be reviewed on a case-by-case basis by the Reserve Management Committee. The committee would evaluate potential impacts to ecological resources and recommend specific routes and time limitations as necessary.

Native American Tribal Values

The four agency stewards and the tribes would work together to communicate, understand and manage for tribal values and perspectives.

Long-Term Management, Public Outreach, and Research

One of the key provisions of this plan is the establishment of a Reserve Management Committee. This committee would be created by Memorandum of Understanding and include representatives of DOE-ID, BLM, USF&W, IDF&G, higher education and Shoshone-Bannock Tribes. Functioning of this committee is important to the success of the provisions of this plan and the long-term management of the Reserve.

This committee would:

- Oversee research, data management and information sharing.
- Oversee management of ecological and cultural resources.
- Coordinate with the INEEL Long-Term Stewardship Program and Wildland Fire Management Committees.

Wildfire

1. The INEEL will establish a Wildland Fire Management Committee to provide recommendations to the DOE-ID Operations Office manager for pre- and post-fire activities and to facilitate implementation of these activities. The committee will consist of experts in cultural resources, threatened and endangered species, vegetation, wildlife, soils, watersheds, air, the Sagebrush Steppe Reserve, the NERP, NEPA, Fire Marshall, Fire Department, Geographic Information Systems and INEEL Infrastructure.
2. The following fuel management zones are managed for reduced fuel loads.
 - Mowing, prescribed fire or a combination of the two will be conducted a minimum of 10-ft and maximum of 50-ft. on each side of all paved roads (State Highways 22, 28, and 33 and Lincoln Boulevard).
 - Mow 5 to 10 ft around WRRTF, with no blading, sterilization or gravel placement being allowed.
 - No fuel management will be conducted along unimproved roads.

2.2 Alternative 1: The Proposed Action

Lands and Minerals

1. Development of new mineral material quarries within the Reserve would no longer be allowed with the exception of the previously permitted clay sources at the Water Reactor Research Test Facility (WRRTF).
2. Development of new utility rights-of-way (ROWs) would not be allowed outside of the State highway ROWs.
3. Existing ROWs and abandoned gravel pits would be inventoried for conflicts with the goals of the Reserve and restored as necessary. Existing ROWs would remain in place.

Roads

1. All non-paved roads and trails within the Reserve would be designated as either open to all authorized vehicles or open to only authorized research vehicles. Under this alternative approximately 105 miles would remain open for all authorized vehicles and 154 miles open to authorized research vehicles only, as shown Map 2. All roads would remain available for emergency access.

2. Routes open to all authorized vehicles would be designated with signs and others would have use tightly controlled by the Reserve Management Committee. All research proposals would be reviewed, with access allowed via specific routes that minimize impacts to ecological resources.
3. Routes available for all authorized vehicles would include: access to BLM and National Forest land in the Lemhi Mountains, all INEEL maintenance priority 1, 2, and 3 roads, the Breeding Bird survey route, necessary access for livestock management and routes to groundwater monitoring wells.
4. Only routes designated as open to all authorized vehicles would be available for public hunting access in the portion of the Reserve now open to hunting.

Noxious and Invasive Plants

1. Implement an Integrated Weed Management Plan (IWM) for the Reserve. IWM consists of actions taken in 4 phases. Phase 1: education, inventory, impact assessment; Phase 2: prioritizing weed problems, choosing and implementing management techniques; Phase 3: adopting proper grazing management; Phase 4: evaluation of management practices (Sheley et al., 1999).
2. All off-road, fire control and construction vehicles entering the Reserve would be routed through the bus washing station at the Central Facilities Area (CFA) to have their undercarriages washed with high-pressure equipment to remove soils potentially containing noxious weed seeds.
3. Areas along roadsides and trails, and around INEEL facilities would be evaluated for undesirable plant encroachment into adjacent native plant communities and treated as necessary. This would include noxious weeds, invasive annual species and crested wheatgrass stands.

Revegetation Project Guidance

1. Only locally collected seed and/or transplants would be used for reestablishment of the perennial plant community.
2. Under special circumstances, other species would be allowed as determined by the Reserve Management Committee following site-specific evaluation.

Livestock Grazing

1. The following requirements would be added to the existing Terms and Conditions applied to each grazing permit.
 - All supplemental feed brought onto the Reserve would be certified weed free.
 - No change in class of livestock would be considered for each allotment
 - No increases in stocking levels would be considered.
2. Each livestock concentration area would be evaluated on a case-by-case basis to determine needs for restoration or other changes in management.
3. 12.4 miles of boundary fence would be constructed along the north and east sides of the Wigwam Butte Allotment. The fence would extend from the eastern end of the existing fence, to and along,

State Highways 22 and 33 to the western boundary of the INEEL and be set back a minimum 200 yards from the highways

4. No construction of water wells would be considered for livestock watering purposes.

Wildlife Habitat

1. All unused power poles would be removed.
2. Active power line systems would have devices installed to make the towers and poles un-useable as perches by raptors.
3. Native plant communities would be restored as necessary.

Surface Water

If a portion of the water from the Birch Creek Hydropower diversion becomes available for use on the Reserve, the water would be returned to the Birch Creek channel. Native riparian plants would be reestablished within the newly created riparian areas as necessary.

Wildfire Management

Fire Suppression

When fires burn under severe conditions, Incident Commanders (ICs) have discretion to use any and all tactics allowed in the INEEL Wildland Fire EA, **consistent with the management objectives of the Reserve. Dozer constructed fire line would be considered only when absolutely necessary.** When fires burn under less severe conditions, fire suppression tactics would be selected from the following prioritized list, **emphasizing use of Minimum Impact Suppression Tactics as described under Alternative 2.** The overall objective would be to stop fires using the least impacting method.

1. A Resource Advisor, **provided by INEEL or BLM,** and knowledgeable of the Reserve management objectives, would be assigned to each fire on, or approaching the Reserve **as early a possible in the fire suppression process.**
2. Aerially applied retardant for containment line construction and fire suppression
3. Allow fires to burn to natural or existing man-made barriers rather than creating newly constructed line
4. Use wet **lines and/or hand-constructed line with cold-trail tactics.**
5. If containment lines are used, they would be located to minimize burning of sagebrush stands and direct impacts to sagebrush by line construction
6. Use of dozers or graders would require concurrence from the Chairman of the Reserve Management Committee, or designate, prior to their use.
7. Bladed containment lines would be located on existing roads where possible
8. Construct newly bladed containment line using minimum width and depth to check fire spread. Locate lines to minimize impact to drainages, sagebrush stands, and cultural/tribal resources

9. Avoid burning-out unburned pockets of vegetation within containment lines, unless absolutely necessary
10. **Use indirect suppression tactics only as a last resort and in a way that minimizes burning of sagebrush.**

Fire Mop-up

1. Islands of unburned vegetation within containment lines would not be burned out
2. Restrict soil disturbance to hot areas near containment lines only
3. Cold-trial interior hot spots to protect residual vegetation.

Fire Restoration

After every fire on the Reserve, the Reserve Management Committee, in conjunction with the INEEL Wildland Fire Management Committee, would conduct evaluation of fire and fire suppression impacts to natural and cultural resources and provide long-term monitoring, mitigation and restoration recommendations using the following guidelines:

1. Restoration would generally be limited to areas where vegetation was destroyed by suppression activities
2. Use only locally collected native seed or transplants and certified weed free materials for mulching
3. Minimizing off-road vehicle use of the burned area
4. Monitor affected areas twice monthly during the first growing season for presence of noxious weeds.

2.3 Alternative 2: No Change in Management Direction

Lands and Minerals

1. Development of new sand and gravel quarries within the Reserve is considered on a case-by-case basis. One 200-acre clay source has been permitted near WRRTF.
2. New ROWs are considered on a case-by-case basis.

Roads

1. Roads and tracks are all available for use by authorized vehicles.
2. All roads are maintained as necessary.
3. Access for big game hunting is allowed on established roads that have not been closed by DOE-ID on a portion of the Reserve north of Highway 33, west of Highway 22, south and west of the Kyle Canyon Road.

Noxious and Invasive Plants

Noxious weeds are treated as INEEL budgets allow.

Revegetation Project Guidance

Current guidance for revegetation at the INEEL is contained in Anderson and Shumar (1989) as amended. This guidance limits revegetation species to the native species included in Table 2 of the document. Use of commercially available cultivars of these species is allowed.

Livestock Grazing

Among others that do not affect this plan, existing Terms and Conditions applied to each grazing permit currently are:

1. Allotments must meet requirements of 43 CFR 4180, Fundamentals of Rangeland Health.
2. Utilization of key upland species shall be no more than 50% of the annual growth.

Wildlife Habitat

The abandoned power line along Lincoln Boulevard has a total of 16 poles, two of which have nesting platforms attached.

Surface Water

As shown in Map 7, out-flows from the Birch Creek Hydroelectric plant flow through a small portion of the Reserve and into the T-28 North gravel pit which is off of the Reserve.

Wildfire

DOE-ID recently completed the NEPA process evaluating fire management options (DOE/EA-1372) for the INEEL. The Finding of No Significant Impact (FONSI) was signed on April 24, 2003. The management actions selected in the FONSI are the existing fire management guidance for the Reserve.

Staged Fire Response

1. The INEEL will use a staged response and incorporate MIST whenever conditions allow.
2. No Resource Advisors are assigned to fires.

Minimum Impact Suppression Tactics (*MIST*)

In Light fuels:

1. Construct containment lines using water or foam and cold-trail tactics
2. Allow fires to burn to natural barriers

3. When using mechanically constructed containment lines:
 - Use minimum width and depth to check fire spread
 - Use Tilted blades
 - Use parallel tactics to minimize containment lines
- Place containment lines to minimize impact on significant environmental resources including waterways, draws, and sagebrush stands.

In Medium to Heavy Fuels:

1. Allow use of natural barriers and cold-trailing.
2. Cool with soil and water and cold-trailing
3. When using mechanically constructed containment lines
 - Use minimum width and depth to check fire spread
 - Use Tilted blades
 - Use parallel tactics to minimize containment lines
 - Place containment lines to minimize impact on significant environmental resources including waterways, draws, and sagebrush stands.

Conventional Fire Suppression Tactics

Direct suppression:

1. Hose line application of water and/or foam from off road fire-fighting equipment
2. Aerial delivery of water and/or chemical retardant using helicopters and air tankers
3. Construction of containment lines up to 24 feet wide on the fire perimeter using dozers, graders and discs.

Indirect suppression:

1. Construct containment lines ahead of advancing fire. Generally using dozers, graders or discs for lines up to 24 feet wide or widening of existing breaks.
2. Pockets of unburned vegetation within the fire perimeter would be preserved as much as possible.

Parallel suppression:

1. Construct containment lines parallel to, but further from the fire than in indirect attack
2. Burn out fuels between containment lines and the fire

3. Construct containment lines to effectively control the fire.

Post-Fire Actions for Dust Suppression

1. Application of chemical soil tackifier and/or mulch
2. Installation of water cannons or snow fences upwind of affected facilities.

Post Fire Mop-up

1. Use cold-trail tactics adjacent to unburned fuels, including interior pockets to detect hot areas.
2. Restrict soil-disturbing activities to hot-spots near containment lines.
3. Use thermal detection devices along perimeter to detect hot-spots.

Site Restoration

1. Site-specific analysis to determine needs.
2. Recontour areas disturbed during suppression actions.
3. Use native species preferred, but use of commercially available cultivars of these species is allowed.

2.4 Alternative 3: Emphasize Natural Resource Protection

Lands and Minerals

This alternative contains the same management direction as proposed for Alternative 1.

Roads

1. All non-paved roads and trails within the Reserve would be designated as either open to all authorized vehicles or open to only authorized research vehicles. As shown in Map 3, this alternative proposes approximately 84 miles to remain open for all authorized users and 165 miles open to authorized research vehicles only as shown on map 3
2. Routes open to all authorized vehicles would be designated with signs and others would have use tightly controlled by the Reserve Management Committee. All research proposals would be reviewed with access allowed via specific routes that minimize impacts to ecological resources.
3. Routes available for all authorized vehicles, would include: access to BLM and National Forest land in the Lemhi Mountains, all INEEL maintenance priority 1, 2, and 3 roads, the Breeding Bird survey route, necessary access for livestock management and routes to groundwater monitoring wells.
4. Only routes designated as open to all authorized vehicles would be available for public hunting access in the portion of the Reserve now open to hunting.

Noxious and Invasive Plants

This alternative contains the same management direction as proposed for Alternative 1.

Revegetation Project Guidance

This alternative contains the same management direction as proposed for Alternative 1.

Livestock Grazing

1. All of the management actions proposed in Alternative 1.
2. Opportunities for purchase, retirement or relinquishment of grazing permits would be pursued from operators willing to sell.

Wildlife Habitat

This alternative contains the same management direction as proposed for Alternative 1.

Surface water

If a portion of the water from the Birch Creek Hydropower diversion becomes available for use on the Reserve, the water would be returned to the Birch Creek channel at as many separate locations as feasible. Map 4 displays potential water return points based upon GIS map data. Native riparian plants would be reestablished within the newly created riparian areas as necessary.

Wildfire

This alternative contains the same management direction as proposed for Alternative 1.

2.5 Alternative 4: Emphasize opportunity for Resource Development

Lands and Minerals

1. Development of new sand and gravel quarries and ROWs would be considered on a case-by-case basis.
2. Existing ROWs and abandoned gravel pits would be inventoried for conflicts with the goals and objectives of the Reserve and restored as necessary.

Roads

This alternative contains the same management direction as currently exists under Alternative 2.

Noxious and Invasive Plants

Implement an IWM Plan for the Reserve. This would include an extensive weed inventory, application of biological pest controls where appropriate, chemical weed control where appropriate, reduction of spread vectors, education of INEEL staff, and coordination with the Continental Divide Cooperative Weed Management Area.

Revegetation Project Guidance

This alternative contains the same management direction as proposed for Alternative 1.

Livestock Grazing

1. Increase livestock stocking to the full preference of Animal Unit Months (AUMs) for each allotment. This is the amount of grazing allotted during grazing district adjudication in the 1960s.
2. To accommodate the increased grazing on the cattle allotments (Sinks and Wigwam Butte), operators would be required to herd cattle to control utilization and distribution. Livestock movement would be based upon monitoring data with maximum utilization levels set to achieve Reserve Management Goals and Objectives.
3. The boundary fence along the north and east sides of the Wigwam Butte Allotment would be extended as under Alternative 1.

Wildlife Habitat

1. All unused power poles would be removed.
2. No active power lines would be modified to eliminate raptor perching.

Surface Water

This alternative contains the same management direction as proposed for Alternative 1.

Wildfire

Alternative 4 contains the same management direction as Alternative 2, with the addition of requiring Resource Advisors be assigned to all fires on or threatening the Reserve.

Table 1. Summary of management alternatives.

Program	Alternative 1: Proposed Action	Alternative 2: No Action	Alternative 3: Emphasize Resource Protection	Alternative 4: Emphasize Opportunity for Resource Development
Lands and Min. 1. Gravel pits 2. ROWs 3. Existing ROWs and gravel pits	1. No New Development, allow currently permitted clay pit 2. No New Development. 3. Inventory and repair where conflicts exist.	1. Allowed. 2. Allowed 3. Monitored for stability	1. Same as #1 2. Same as #1 3. Same as #1.	1. Same as #2 2. Same as #2. 3. Same as #1.

Table 1. (continued).

Program	Alternative 1: Proposed Action	Alternative 2: No Action	Alternative 3: Emphasize Resource Protection	Alternative 4: Emphasize Opportunity for Resource Development
Roads 1. Open to all authorized uses 2. Open for authorized 'authorized research only' 3. Road maintenance	1. 95 miles 2. 154 miles 3. Controlled by Reserve Mgt. Committee	1. 259 miles 2. 259 miles 3. All roads maintained as necessary.	1. 84 miles 2. 165 miles 3. Controlled by Reserve Mgt. Committee	1. 259 miles 2. 259 miles 3. All roads maintained as necessary.
Weeds 1. Control 2. Vehicles 3. Seeded Areas	1. IWM 2. Specific high risk types washed at bus garage 3. Evaluated for conflicts	1. Limited spraying. 2. No controls 3. No evaluation	1. IWM 2. Same as #1 3. Same as #1.	1. IWM 2. Same as #2 3. Same as #2
Revegetation Direction	Only local genotypes of native species.	Allows for mixtures of native species and commercially available cultivars of these species.	Same as #1.	Same as #2
Livestock 1. Supplemental feed. 2. Stock concentration areas 3. Fencing 4. Class of livestock 5. Stocking	1. Cert. Weed Free 2. Inventory for remediation 3. Eastern and southern boundaries of Wigwam Butte fenced 4. No changes 5. No increases	1. No limits 2. No limits 3. Current partial fence between Wigwam Butte and Mahogany 4. May be changed after NEPA analysis 5. May be changed after NEPA Analysis.	All limitations in Alternative 1 with phasing out of livestock grazing by voluntary relinquishment of permits	1. Same as #1 2. Same as #1 3. Same as #1. 4. Same as #2. 5. Increased to adjudicated capacities with herding required.

Table 1. (continued).

Program	Alternative 1: Proposed Action	Alternative 2: No Action	Alternative 3: Emphasize Resource Protection	Alternative 4: Emphasize Opportunity for Resource Development
Wildlife 1. Raptor perches	Remove all abandoned power poles and install anti-perching devices on active power lines.	Nest platforms and perches on some abandoned power poles, some artificial nesting platforms, active power poles available for raptor perches	Same as #1.	Only remove abandoned power poles.
Surface water	Return a portion of the Birch Cr. winter return flows to one location, if available.	B.C. Hydro winter returns into gravel pit	Return a portion of Birch Cr. flows to as many as 3 locations, if available.	Same as #1
Wildfire 1. Resource Advisors 2. Suppression 3. vegetation burnout within containment lines 4. Fire rehab.	1. Assigned to all fires 2. Prioritized list of suppression tactics including MIST. 3. only as last resort 4. Only suppression areas following site specific evaluation	1. None 2. All suppression tactics available including MIST. 3. as necessary 4. Site specific evaluation. Species allowed as under Revegetation section.	Same as #1	1. Assigned to all fires. 2. Same as #2 3. Same as #2. 4. Same as #1

3. AFFECTED ENVIRONMENT

As shown in Map 1, the Reserve is located on the northwest corner of the INEEL and covers approximately 73,263 acres. This is a cold desert area at an average elevation of approximately 5,200 feet and large daily and season temperature fluctuations. The average annual temperature is 42 degrees and snow cover typically lasts for 2 to 3 months. During summer, low humidity and clear skies result in high evaporative demand during the day and low temperatures at night. Being in the rain shadow of several mountain ranges, the area has an average annual precipitation of only about 8.6 inches. About one third of this precipitation comes during the early growing season with plant available moisture generally used by early July.

Arguably, the most significant resources on the Reserve are the pre-European settlement condition plant communities that have developed since the withdrawal of the INEEL lands between 1946 and 1958.^a Prior to that time, severe drought and unlimited livestock grazing had led to plant communities dominated by shrubs with very little perennial herbaceous understory (Anderson and Inoyue, 2001). With limited human access, the plant communities have improved to the Relic (State II) conditions as described by West (2000). Approximately 50% of the Reserve has had very little livestock grazing during that time.

The regional climate predisposes the area to recurring fire, and fire has played an important role in the evolution of many cold desert plants. Historic fire occurrence intervals ranged from 20 to 100 years (Wright and Bailey, 1982). The majority of native plant species survive these infrequent wildfires, especially fires occurring in late summer or fall when plants are dormant. Notable exceptions are the several varieties of big sagebrush which must re-colonize burned areas by seed dispersal. The introduction and spread of cheatgrass has disrupted historic fire regimes in many parts of the Intermountain West and increasingly threatens the Reserve.

3.1 INEEL Facilities

TAN is located less than 1/2 mile from the Reserve boundary and is composed of two active operations areas: the Contained Test Facility and the Technical Support Facility; and two inactive areas: the Initial Engine Test Facility and WRRTF. WRRTF is the only facility within the Reserve boundary, is out-of-service and is slated for demolition. All of the TAN facilities are surrounded by a defensible space capable of protecting them from wildfire.

3.2 Lands and Minerals

The Reserve covers portions of each of the four Public Land Order (PLO) withdrawals that created the INEEL. Beginning in 1946, PLOs withdrew public lands for the use of the Departments that eventually became DOE-ID. Each withdrawal allows for specific land uses and eliminates other traditional forms of multiple-use. Potential land uses on the Reserve are limited to livestock grazing, ROWs and mineral material extraction. By Memoranda of Understanding, the BLM administers these programs with DOE-ID approval.

One Utah Power and Light 230 KV power line and two INEEL 138 KV lines cross the Reserve. The Reserve portion of the Utah Power and Light line is approximately 12 miles long with 81 support structures. The INEEL East Loop is approximately 9 miles long and the West Loop is 10.5 miles long.

a. Public Land Orders 318, 545, 637, and 1770.

These INEEL lines have a total of about 150 support structures. State Highways 22, 28 and 33 are on portions of the Reserve with several buried optical phone lines within the highway ROWs.

Portions of the Reserve contain extensive deposits of mineral materials (sand, gravel or clay). While these have been mined in the past for highway construction and DOE-ID uses, there are currently no active quarry sites. The old quarry sites have all been abandoned and reclaimed. One 200 acre silt/clay site has been permitted near WRRTF. Only the area withdrawn by PLO 1770 is available for mineral material development. This withdrawal covers about 30% of the Reserve and is generally located north of Highway 22.

3.3 Roads

The Reserve contains a variety of highways and roads ranging from paved State Highways to lightly used two-track trails. State highways are constructed and maintained to standards established by the Idaho Department of Transportation. They are paved, receive high volumes of high-speed traffic, and are engineered to specific standards. Paved State Highways crossing the Reserve include Highways 22, 28 and 33. These have a total length of 23 miles on the Reserve and cover approximately 91 acres. Lincoln Road is a paved INEEL access highway also crossing the Reserve.

For both public safety and INEEL security, public use of INEEL roads off of the State Highways is not allowed without specific DOE-ID authorization. Public access is allowed on established roads only in specified portions of the Reserve for big game hunting.

The Reserve contains approximately 259 miles of interior INEEL roads and trails, some of which are graveled, but most being two-track dirt trails. Many of these tracks date from the 1940s or earlier and have been kept in existence through use, both official and unofficial. Other trails shown on maps may no longer exist due to discontinued use and natural revegetation.

Major roads have been assigned specific "T" numbers, of which T-9, T-17, T-23, T-27 and T-28 are on the Reserve and T-20 serves as the southwestern boundary. See Alternatives 1 and 3 Roads maps. Many roads have been assigned classifications which determine maintenance priority: For example, Priority 1 emergency evacuation roads are kept graded for rapid 4WD passage; Priority 2 powerline roads and Priority 3 wildfire access roads are graded as necessary; and Priority 4 primitive roads are not maintained. Permitted road uses include fire suppression, livestock herder access, stock-water hauling, research, site security, big game hunting and other INEEL specific needs. Duplication in access and use exists between many of the Priority 4 roads.

3.4 Noxious and Invasive Plants

Idaho Noxious weeds identified on the Reserve include black henbane (*Hyoscyamus niger*), musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), Dalmation toadflax (*Linaria genistifolia*), spotted knapweed (*Centaurea maculosa*), Russian knapweed (*C. repens*), leafy spurge (*Euphorbia esula*) and Rush skeletonweed (*Chondrilla juncea*). Much of the Reserve has not been inventoried for weed infestations, but known locations of some of these species are shown on Map 5. Other significant invasive species, not on the noxious weed list, include cheatgrass, halogeton (*Halogeton glomeratus*), Russian thistle (*Salsola kali* ssp. *tragus*), and tumble mustard (*Sisymbrium altissimum*). Currently none of these occupy large acreages on the Reserve, but their expansion is likely due to their aggressive nature. In a literature survey, Pyke (1999) identified 46 exotic species that are weeds capable of invading sagebrush steppe ecosystems, with as many as 20 of these classed as highly invasive and competitive.

While cheatgrass is not common on the Reserve, it is scattered along roads and in areas of livestock concentration, such as along the dry Birch Creek channel. The potential for this invasive annual to increase on the Reserve and concurrently increase fire frequency, is a significant threat to the integrity of the native plant communities. Research has shown that this species typically increases in areas of soil disturbance throughout the region (Pellant, 1996). The State highways crossing the Reserve, the network of INEEL access roads, livestock grazing, and movement of wildlife species all provide significant vectors for expansion of these undesirable plants.

Crested wheatgrass is well established on the Reserve along Lincoln Boulevard, the State Highways and surrounding WRRTF where it was seeded in the past for reclamation. In all of these areas, the crested wheatgrass is spreading into adjacent native plant communities. Many researchers have found this to be common within the region (Box, 1986; Pyke, 1996; Elliot and White, 1987; Powell et al., 1994; Walker et al., 1995).

3.5 Native Plants

While no extensive vegetation inventory specific to the Reserve has been conducted, an INEEL wide survey identified approximately 400 species of vascular plants (Anderson et al., 1996). Natural vegetation typically consists of a shrub overstory with a perennial forb and grass understory. The most common shrubs are Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), and green rabbitbrush (*Chrysothamnus viscidiflorus*). The understory is generally dominated by thick-spiked wheatgrass (*Elymus lanceolatus*), bottlebrush squirreltail (*Elymus elymoides*), Indian ricegrass (*Oryzopsis hymenoides*), needle-and-thread grass (*Stipa comata*), Sandbergs bluegrass (*Poa secunda*) and bluebunch wheatgrass (*Pseudoroegneria spicata*). Eighty-five percent of the vascular plant species are native, and three-fourths of those are forbs (Anderson, 1999).

The character of plant communities on sagebrush steppe is defined by continuous competition for limited water. There is a shared dominance between shrubs and herbaceous understory vegetation. Shallow, fibrous-rooted herbaceous plants are favored in wetter years, thriving on spring rains, while deeply rooted shrubs have the competitive advantage during droughts and survive by tapping deeply infiltrated moisture (West, 2000). In North America, these communities are widely distributed in the Great Basin, and upper Columbia, Missouri, and Colorado River Basins. The southern limits of the sagebrush steppe are the semi-deserts of the Southwest (West, 2000) with the wettest communities extending into the open Douglas fir, Ponderosa pine and juniper communities of the Sierras, Cascades and Rocky Mountains.

3.5.1 Major Native Plant Communities

Vegetation community classifications for the Reserve have been compiled primarily from three sources that describe distinct community types encompassed within the larger, more general sagebrush steppe ecosystem on the INEEL. The references used to describe the following community types include *Plant Communities, Ethnoecology, and Flora of the Idaho National Engineering Laboratory* (Anderson et al., 1996), *Vegetation Types and Surface Soils of the Idaho National Engineering Laboratory Site* (McBride et al., 1978), and *Vegetation Studies to Support the NPR Environmental Impact Statement* (Anderson, 1991). Polygons from the McBride et al. (1978) map were used to delineate major vegetation types, however, community classifications follow the more recent classifications described by Anderson et al. (1996). A single vegetation class was assigned to many of the polygons; however, a combination of two vegetation classes were assigned to some polygons where two vegetation types form heterogeneous patches within the polygon. Note that two vegetation types, Sagebrush/Saltbush and Sand Dunes, that were not described as distinct classes in Anderson et al. (1996) have been added.

Vegetation data were collected on the Reserve in late summer and fall of 2002. These data, in conjunction with data from the sources listed above and data from BLM monitoring plots, were used to assign vegetation classes to each polygon as shown on Map 6. The 2002 vegetation data were also used to tailor the Anderson et al. (1996) vegetation class community descriptions to the plant communities on the Reserve, and to provide more detailed descriptions of polygons labeled as complexes. Species nomenclature follows the National PLANTS Database (USDA, NRCS, 2002).

Juniper Woodlands: These communities generally have an overstory of Utah juniper (*Juniperus osteosperma*) which may be co-dominant with Wyoming big sagebrush or black sagebrush (*Artemisia nova*). Occasionally, neither sagebrush species is present, with the understory being dominated by native grasses and forbs.

Additional shrub species commonly found include green rabbitbrush, shrubby buckwheat (*Eriogonum microthecum*), and prickly phlox (*Leptodactylon pungens*). Typical understory grasses include Indian ricegrass, needle-and-thread grass, and bluebunch wheatgrass. Indian ricegrass and needle-and-thread grass tend to be common in lower elevation juniper communities with bluebunch wheatgrass becoming more prevalent with increasing elevation. Forbs common to this community class include arrowleaf balsamroot (*Balsamorhiza sagittata*), tapertip hawksbeard (*Crepis acuminata*), Hood's phlox (*Phlox hoodii*), and ballhead gilia (*Ipomopsis congesta*).

Grasslands: The composition of these communities is highly variable, but all are dominated by perennial grasses. These may be rhizomatous species, bunchgrasses, or a combination of both. Thick-spiked wheatgrass, western wheatgrass (*Pascopyrum smithii*), creeping wildrye (*Leymus triticoides*), and Douglas' sedge (*Carex douglasii*) are common dominant rhizomatous species. Dominant bunchgrass species include Great Basin wildrye (*Leymus cinereus*), Indian ricegrass, bottlebrush squirreltail, needle-and-thread grass, Sandberg bluegrass (*Poa secunda*), and bluebunch wheatgrass. Most commonly, grasslands on the Reserve are dominated by needle-and-thread grass and/or Indian ricegrass, with thick-spiked wheatgrass occurring very frequently. Grasslands may also include crested wheatgrass (*Agropyron cristatum*) seedlings.

Shrubs often occur within grassland communities, but shrub cover is generally sparse. Shrub species frequently include black sagebrush, Wyoming big sagebrush, basin big sagebrush, green rabbitbrush, and prickly phlox. Gray horsebrush (*Tetradymia canescens*) and shrubby buckwheat may also occur sporadically. Pricklypear (*Opuntia polyacantha*) is often locally abundant. Forbs typically occurring in Reserve grasslands include whitestem globemallow (*Sphaeralcea munroana*), whitestem blazingstar (*Mentzelia albicaulis*), western tansymustard (*Descurainia pinnata*), and western stickseed (*Lappula occidentalis*). A number of alien species may also be common within this vegetation type.

Sagebrush Steppe: Sagebrush steppe communities on the Reserve are generally dominated by Wyoming big sagebrush, but Basin big sagebrush may dominate or the two species may co-dominate. Basin big sagebrush patches generally are surrounded by extensive stands of Wyoming big sagebrush. The distribution and abundance of these two subspecies is related to soil depth and texture. Basin big sagebrush tends to dominate on deep, well drained, sandy soils, such as those found on the lee side of lava ridges where sand accumulates, and in and around stream channels. Conversely, Wyoming big sagebrush tends to dominate on fine-textured, shallower soils. Typically, native perennial grasses are more abundant under Wyoming big sagebrush than under basin big sagebrush. Aside from differences in grass abundance, both sagebrush species have similar understory species compositions with species variability under basin big sagebrush being higher.

Common understory grasses in sagebrush steppe communities include thick-spiked wheatgrass, Indian ricegrass, needle-and-thread grass, and Sandberg bluegrass. Green rabbitbrush, winterfat

(*Krascheninnikovia lanata*), prickly phlox, and spiny hopsage (*Grayia spinosa*) are frequently occurring shrubs. Green rabbitbrush, winterfat and pricklypear can be locally quite abundant. Shadscale (*Atriplex confertifolia*) may also occur occasionally in low densities. Common forbs include fernleaf biscuitroot (*Lomatium dissectum*), threadstock milkvetch (*Astragalus filipes*), Hood's phlox, and hoary aster (*Machaeranthera canescens*).

Winterfat/Sagebrush. These communities are either dominated by winterfat, or co-dominated by winterfat and Wyoming big sagebrush. Green rabbitbrush occurs frequently and gray horsebrush occurs sporadically, but may become locally abundant. Spiny hopsage may also occur sporadically. Perennial grasses are frequently abundant in winterfat/sagebrush communities, especially Indian ricegrass. Additional common grasses include thick-spiked wheatgrass and bottlebrush squirreltail. Within this community, Hood's phlox and hoary aster are some of the most frequently occurring forbs.

Salt Desert Shrub: Three distinct salt desert shrub community types are found within the Reserve. All three occur on playas within the Lake Terreton drainage, are characterized by a high percentage of bare ground and contain winterfat and other members of the chenopod family. Plant species compositions of these three community types can vary considerably.

The first salt desert shrub community type is dominated by Nuttall's saltbush (*Atriplex nuttallii*). Shrubby buckwheat and winterfat are common and either species may be co-dominant. Indian ricegrass and bottlebrush squirreltail often occur, and Wyoming big sagebrush and thick-spiked wheatgrass may be locally abundant, but not dominant.

The second type of salt desert shrub community is dominated by shadscale. Winterfat, green rabbitbrush and Indian ricegrass may be abundant with Nuttall's saltbush occurring occasionally. Spiny horsebrush, greasewood (*Sarcobatus vermiculatus*), and western wheatgrass also occur sporadically.

The third community type is co-dominated by fourwing saltbush (*Atriplex canescens*) and winterfat. This vegetation type covers a relatively minor area with low perennial grass and forb cover being characteristic.

Sagebrush/Saltbush: This vegetation class represents communities in which sagebrush species dominate and salt desert shrub species are common. This community is differentiated from sagebrush steppe communities by a higher content of salt desert shrub species. Wyoming big sagebrush is always a dominant species, and black sagebrush or low sagebrush (*Artemisia arbuscula*) may be co-dominant and are generally present. Shadscale is typically the most common salt desert shrub species and winterfat may also be abundant. Additional commonly occurring shrubs include green rabbitbrush and fourwing saltbush. Indian ricegrass is nearly always present with needle-and-thread grass and bottlebrush squirreltail being locally abundant.

Low Sagebrush: Low sagebrush vegetation types are characterized by the dominance of low sagebrush, black sagebrush or a combination of both, but low sagebrush is usually the dominant. Although both species occur on shallow soils, black sagebrush tends to become a dominant only on lava ridges. Wyoming big sagebrush, shadscale, and green rabbitbrush commonly occur and may be locally abundant. Additional shrubs include winterfat, broom snakeweed (*Gutierrezia sarothrae*), and prickly phlox.

Most low sagebrush communities have an abundance of native perennial bunchgrasses and forbs. Bottlebrush squirreltail and Indian ricegrass are typically quite abundant with needle-and-thread grass, bluebunch wheatgrass, and Sandberg bluegrass common. Indian ricegrass and needle-and-thread grass occur frequently at lower elevations with bluebunch wheatgrass becoming prevalent with increasing

elevation. Pricklypear distribution is widespread and common forbs include Hood's phlox, northwest Indian paintbrush (*Castilleja angustifolia*), and shaggy fleabane (*Erigeron pumilus*).

Rabbitbrush/Sagebrush: Dominated by green rabbitbrush or co-dominated by green rabbitbrush and Wyoming big sagebrush, these communities can have a rich understory of perennial grasses and forbs. Winterfat occurs frequently and gray horsebrush may be locally abundant. Common grasses in this community type include needle-and-thread grass, thick-spiked wheatgrass, and bottlebrush squirreltail. Great Basin wildrye may be locally abundant, and Indian ricegrass occurs regularly, but usually in low densities. Forbs frequently included are Hood's phlox, ballhead gilia, Wilcox's woollystar (*Eriastrum wilcoxii*), Torrey's milkvetch (*Astragalus calycosus*), hoary aster, and Douglas' dustymaiden (*Chaenactis douglasii*).

Sand Dunes: These areas have sparse vegetative cover with unstable substrate. Most plant cover comprises annual species such as Russian thistle (*Salsola kali*) and tall tumble mustard (*Sisymbrium altissimum*). Indian ricegrass also occurs intermittently at low densities.

Sagebrush Steppe—Sagebrush/Saltbush Complex: A complex of the sagebrush steppe and sagebrush/saltbush vegetation classes occur associated with the channels of the Birch Creek drainage. Sagebrush steppe communities within this complex are primarily dominated Basin big sagebrush and are found on deep soils. The sagebrush/saltbush communities within this complex are dominated by Wyoming big sagebrush and have an abundance of shadscale with low sagebrush often present.

Sagebrush/Saltbush—Low Sagebrush Complex: This landscape is found on a basalt lava flow that has had subsequent loess accumulation and soil formation. The low sagebrush communities are dominated by black sagebrush and occur on, and around exposed basalt outcrops. The sagebrush/saltbush vegetation is found in the lower lying areas and is dominated by Wyoming big sagebrush with abundant shadscale and low sagebrush.

3.5.2 Long-Term Vegetation Changes

In 2001, Jay Anderson and Richard Inouye from Idaho State University analyzed data from permanent vegetation plots established in 1950 on the INEEL (Anderson and Inouye, 2001). Ninety two plots were sampled in 1950, 1957, 1965, 1975, 1985, and 1995. Of these, 47 have not been grazed by livestock since 1950, with the remaining 35 being grazed. Those plots on the Reserve are displayed on Map 6. When the plots were established, the region had been in severe drought for almost 20 years and had a history of heavy livestock grazing dating back to the 1880s. The data from 1950 showed very low cover of perennial grasses, low density and richness of perennial forbs, dominance of plots by sagebrush and other shrubs, and homogeneity of plots. The authors performed numerous cluster analyses and ordination of the data from the 47 core plots.

Their general findings included:

- Although the plots were dominated by shrubs in 1950, large changes in vegetation were measured over the 45 year period, refuting the idea that shrub dominance is irreversible. This reflected the increased capacity of individual species to capitalize on local variation of resources and inherent randomness of plant establishment once growing conditions improved.
- Cover of each of the most common perennial grasses increased many fold between 1950 and 1975. Cover of bottlebrush squirreltail, Indian ricegrass and needle-and-thread grass, then declined after 1975, while that of thickspike wheatgrass and bluegrasses (*Poa* spp.) remained high until the

mid-1980s before declining. Total cover of perennial grasses increased from .5% in 1950 to 6.2% by 1975, then varied between 1.4% and 4.0% until 1995.

- Shrubs dominated vegetative cover in all years, but peaked in 1975. Subsequent decreases were attributed to widespread mortality of basin big and Wyoming sagebrush species, the two dominant species. The reasons for the die off were likely due to the multiple stressors of sagebrush webworm, high vole populations, soil conditions and fungal parasites.
- While aggregate species richness for shrubs and perennial grasses changed little over the 45 years, the mean species richness, per plot increased during the period. This was due to expansion of previously isolated populations rather than immigration of new species.
- With the exception of increase in perennial grasses, general increase in species richness, and a continuous increase of green rabbitbrush, there was little evidence of directional change in plant species composition.
- There was no evidence of seral replacement among the perennial grasses. The data did not suggest succession as predicted by classic rangeland models. Apparently viable remnant populations were able to take advantage of the improved conditions after 1950 and there was also very little cheatgrass or other invasive annuals present until 1975.
- The plots became much more heterogeneous through time, rather than converging on some potential or climax. This is as expected as communities recover from the combined effects of grazing and drought. Grazing tends to homogenize vegetation by removing the most palatable species, thereby reducing biodiversity.
- There were no significant correlations between cover and current year precipitation. Analysis indicated that there was possibly a 2 to 4 year lag in the responses of species or functional groups to precipitation patterns. Each species responded individually to environmental variations. The large variations in regional precipitation, both annually and long-term, may be important to the coexistence of shrubs and perennial grasses in this ecosystem.
- Cover data for perennial grasses and shrubs indicate that, at least in some years, competition affected the abundance of some species. There were significant negative correlations between cover of perennial grasses and cover of shrubs in seven of the nine sample years.
- Functional stability of the plant community, total cover, and by inference, total productivity were directly correlated to species richness.
- Invasion of cheatgrass increased dramatically between 1965 and 1975 and the number of plots with this exotic has increased in the years since. Point frame data indicate that the cover of cheatgrass is inhibited by cover of native species.

3.5.3 Rare Plant Species

No plant species listed as Endangered or Threatened under the ESA are known to occur on the Reserve. Table 2 lists those rare plant species known and their status.

Table 2. Rare plants known to occur on the reserve.

Species	National Heritage Program ^a	INPS Rank ^a	IDFG Rank ^a	Federal Rank (USFWS) ^a	BLM Rank ^a	Comments
Lemhi milkvetch <i>Astragalus aquilonius</i>	S3	S			S	Generally on unstable, steep banks, sandy washes and gullies within the shrub-steppe zone at lower elevations. (ICDC, 2002).
Winged-seed evening primrose <i>Camissonia pterosperma</i>	S2	S	S		S	Found on dry, open slopes, ridges, and washes in the sagebrush and pinyon-juniper zones associated with <i>Juniperus osteosperma</i> and <i>Artemesia arbuscula</i> . (Cholewa and Henderson, 1984)
Spreading gilia <i>Ipomopsis polycladon</i>	2	2	2		S	Dry, open places in the foothills and valleys, with sagebrush and sometimes <i>Atriplex</i> . (ICDC, 2002).
Earth lichen <i>Catapyrenium congestum</i>	S		S			Known on the INEEL, near the Reserve. (Mosley and Pitner, 1996) Uncommon in <i>Artemesia</i> and <i>Atriplex</i> communities in southern Idaho and Utah

a. Refer to Appendix I for explanations of rankings.

3.6 Livestock Grazing

The Reserve contains portions of four grazing allotments as shown on Map 7. These are managed by the BLM in conjunction with adjacent public lands under a Memorandum of Understanding with DOE-ID. With essentially no perennial water on the Reserve, grazing suitability and capacity are limited. Water must be hauled to stock tanks located on BLM land within each allotment. By DOE-ID policy, approximately 41,071 acres of the Reserve are not within grazing allotments and are grazed infrequently by livestock.

Table 3. Grazing allotment ownership and use.

Allotment	Total Acres	Private and State Acres	BLM Acres	INEEL Acres	Reserve Acres	Total Grazing Preference (AUMs)	Total Active Preference (AUMs)	Active Preference on Reserve (AUMs)
Wigwam Butte	15,287		5,120	10,167	10,167	1,236	967	642
Sinks	20,421	640		19,781	3,870	1,511	1,333	253
Twin Buttes	196,724	6,923	9,382	180,419	3,540	17,430	14,630	263
Mahogany Butte	55,891	3,440	34,935	17,516	14,682	1,806	1,806	471

Cattle Allotments

The Sinks and Wigwam Butte allotments, located along the west side of the Reserve, are grazed by cattle. Generally, there are no allotment boundary fences with livestock distribution being controlled by water placement. The boundary between the Wigwam and Mahogany Butte Allotments is partially fenced, allowing livestock drift onto adjacent allotments or into the un-grazed area.

Sheep Allotments

Sheep are grazed on the Twin Buttes and Mahogany Butte Allotments, which cover the northern end and east side of the reserve. Distribution of the sheep is controlled by herding. Twin Buttes is a common allotment with 15 permittees herding bands of sheep over 196,724 acres. Approximately 2% of the Twin Buttes Allotment is on the Reserve.

Table 4. Grazing allotment permittees and

Allotment	Permittee	Number of Animals	Total Active Preference (AUMs)	Active Preference on Reserve (AUMs)	Season of Use	Stocking rate
Wigwam Butte (BLM file #2032)	Woodie Land and Livestock	323	592	394	May 1 to June 25	16 acres/AUM
		375 Cattle	375	248	Jan 1 to Jan 31	
Sinks (BLM file #2020)	Woodie Land and Livestock	Cattle	460	87	May 1 to June 25	14 acres/AUM
			25	5	Jan 1 to Jan 31	
			221	42	May 1 to June 25	
	Robert Mays	100 Cattle	473	90	May 1 to Sept. 22	
	Dean Mays	70 Cattle	154	29	May 1 to July 6	
Twin Buttes (BLM file #13000)	Common use allotment with 15 permittees	33,002 Sheep	14,630	263	Generally winter or spring grazing by the various permittees	13 acres/AUM
Mahogany Butte (2025)	Ball Brothers Sheep Co.	1146 2400 Sheep	543 1263	143 328	April 20 to June 30 Dec 11 to Feb 28	29 acres/AUM

3.7 Wildlife Habitat

A variety of ephemeral and unique habitats exist on the Reserve that increase the diversity of wildlife species found there. While the vast majority of the area is sagebrush, grassland and salt desert shrub, the juniper woodlands, lava flows, cinder cones, lava tubes, ephemeral playa lakes and remnant riparian habitats create niches for many more species than would otherwise be expected. Five fish, one amphibian, nine reptile, 159 bird and 37 mammal species have been documented on the INEEL (Reynolds et al., 1986). An additional nine fish, five reptile, 13 bird and 14 mammal species are listed as possibly occurring because portions of their range overlap the INEEL area, or they have been reported within 30 km of the site.

Wildlife species of management significance are categorized into four major groups (Sperber et al., 1998):

- A. Endangered and Threatened Species
- B. Species of special concern (State, Federal and Tribal)
- C. Big Game species
- D. Sagebrush Obligate species.

3.7.1 Endangered and Threatened Wildlife Species

This category includes species that the FWS has classified as endangered or threatened under the ESA. The ESA provides Federal protection for certain species of plants and animals and their critical habitats, and authorizes the Secretary of the Interior to develop and implement recovery plans for each listed species. Bald eagles are listed as Threatened and have been documented on the Reserve. Their use is primarily during the winter months. The Gray wolves in the region are listed as an Experimental/non-essential population. They have not been documented on the Reserve, but could reach the area by dispersing from established packs to the north and east.

3.7.2 Species of Special Concern

The FWS also provides a listing of plants and animals that are **species of concern** due to population status and/or threats to their long-term viability. **Culturally significant species** were added by the Shoshone-Bannock Tribes. All of these species have no legal status under the ESA, but are considered by agencies and the tribes during project planning and review.

Wildlife Species of Special Concern Potentially Occurring on the Reserve

Mammals

Species of Concern

pygmy rabbit (*Brachylagus idahoensis*)
small-footed myotis (*Myotis ciliolabrum*)
long-eared myotis (*Myotis evotis*)
Townsend's big-eared bat (*Plecotus townsendii*)
Merriam's shrew (*Brachylagus idahoensis*)

Culturally Significant Species

coyote (*Canus latrans*)
badger (*Taxidea taxus*)
yellowbelly marmot (*Marmota flaviventris*)
blacktail jackrabbit (*Lepus californicus*)
Whitetail Jackrabbit (*Lepus townsendi*)
pronghorn (*Antilocapra Americana*)
elk (*Cervus canadensis*)
mule deer (*Odocoileus hemionus*)
Whitetail deer (*Odocoileus virginianus*)
muskrat (*Ondatra zibethica*)

Birds

Species of Concern

sage grouse (*Centrocercus urophasianus*)
ferruginous hawk (*Buteo regalis*)
long-billed curlew (*Numenius americanus*)

Culturally Significant Species

bald eagle (*Haliaeetus leucocephalus*)
golden eagle (*Aquila chrysaetos*)
red tailed hawk (*Buteo jamaicensis*)
burrowing owl (*Speotyto cunicularia*)
woodpeckers (*Picoides* and *Colaptes* spp.)
great horned owl (*Bubo virginianus*)
all migratory waterfowl

Amphibians and Reptiles

Species of Concern

western toad (*Bufo boreas*)
Northern leopard frog (*Rana pipiens*)
Ringneck snake (*Diadophis punctatus*)
western terrestrial garter snake (*Thamnophis elegans*)
short-horned lizard (*Phrynosoma douglassi*)

Culturally Significant Species

western rattlesnake (*Crotalus viridis*)

3.7.3 Big Game Species

Big game species have high recreational interest from a hunting and wildlife viewing standpoint. Species in this category found on the Reserve include pronghorn antelope, elk, and mule deer.

Pronghorn antelope: The Reserve is pronghorn transition range in all years and provides winter range to a large percentage of the regional herds in mild winters. The animals migrate to winter range from the Birch Creek Valley where they spend the summer months. During periods of high herd numbers, some pronghorn may summer on the Reserve. Of particular concern to biologists is a declining fawn:doe ratio observed in recent years due to unknown causes.

Elk: Elk wintering on the INEEL has been documented since the mid 1980s (Moritz 1988 as cited in Strohmeier, D.C. and J.M. Peek 1996). Herds migrated from the Valleys of the Little Lost, Birch Creek, Crooked Creek, Medicine Lodge, and Sand Creek. Wintering populations ranged from 150 in 1989 to 650 in 2000 (unpublished report, May 17, 2000, Environmental Science & Research Foundation, Inc.). Depredations on adjacent farmlands began to develop in the late 1980s as growing numbers of elk remained on the INEEL year-round. Summer populations ranged from 50 elk in 1995 to 142 in 1999, depending upon water availability (Unpublished report, September 7, 1999 Environmental Science & Research Foundation, Inc.). Once water on the site was gone, elk moved to adjacent farmlands where irrigation systems offered not only water, but also green vegetation throughout the dry summer months. Special depredation hunts, hazing and trapping have been tried, but have met with only short-term success and have often created public controversy.

Mule deer: Approximately 150 to 200 mule deer frequently winter in the unnamed drainage on the southwest end of the Lemhi Range. Bitterbrush and mountain mahogany stands in this area are especially important to the wintering animals. Smaller numbers also winter on the Birch Creek side of the Lemhi Range. Most deer that winter on the Reserve spend the summers to the north and west. The maintenance of high quality winter range for Mule Deer is vital to securing an abundant mule deer population.

3.7.4 Sagebrush Obligate Species

Sagebrush obligate species require sagebrush for some portion of the year for survival. With continued regional decline in sagebrush steppe habitats, populations of these species are declining. The prospect of significant additional Threatened or Endangered species listings has prompted Federal and state agencies to develop conservation strategies and working groups to aid in protecting and restoring western rangelands. The Upper Snake Sage Grouse Local Working Group is an example of groups attempting to conserve these species before they are listed.

Species in this category potentially found on the Reserve include the following:

Birds

- sage thrasher (*Oreoscoptes montanus*)
- sage sparrow (*Amphispiza belli*)
- sage grouse (*Centrocercus urophasianus*)
- Brewer's sparrow (*Spizella breweri*)

Mammals

- pronghorn antelope (*Antilocapra Americana*)
- pygmy rabbit (*Brachylagus idahoensis*)
- sagebrush vole (*Lagurus curtatus*)

Reptiles

- northern sagebrush lizard (*Sceloporus graciosus*)

Sage Grouse

Sage grouse have received the most attention of the sagebrush obligate species and have established management guidelines (Appendix 2). Large amounts of scientific research have been conducted and recent petitions for listing have highlighted their plight. Sage grouse populations have exhibited long-term declines throughout North America. Data from breeding areas (leks) compiled by the Upper Snake/Salmon Local Working Group show an average of 40–50% decline from long-term averages (IDF&G unpublished data). The sage grouse on the INEEL are a migratory population. They typically move large distances during seasonal migrations, as much as 52 miles over the course of a year (Connelly and Ball, 1982). Most grouse from the Reserve move up the Birch Creek Valley during the summer.

The entire Reserve has been identified as key sage grouse habitat due to the intact sagebrush steppe habitat found there. Sage grouse are considered an umbrella species and the assumption is made that habitat needs for other sagebrush obligate species are being benefited as a result of protection, improvement and restoration of sage grouse habitat (Sather-Blair et al., 2000).

Sage Grouse Breeding Habitat

With four known leks in the northern part of the reserve, the birds have been shown to move as much as 18 km (11 miles) from leks to nest sites, making all suitable habitat within 18 km of the leks potential nesting habitat. Approximately 64,883 acres, or 89% of the Reserve, are within this distance, but portions of the Reserve do not meet the requirements for suitable nesting habitat as defined in the current sage grouse management guidelines (Connelly et al., 2000) contained in Appendix 2. Radio relocations of nesting hens in 2000 and 2001 indicated successful incubation on two nests in the northern part of the reserve in each of those years. Sagebrush and herbaceous cover provide food and concealment from predators.

Sage Grouse Late Brood-rearing Habitat

From late June to early November, sage grouse use a variety of moist and mesic habitats where succulent forbs are found. These include riparian areas, wet meadows, lake-beds, farmlands, some sagebrush habitats and recently burned areas.

Sage Grouse Winter Habitat

During the winter, sage grouse feed almost exclusively on sagebrush. Topographic relief and diversity of sagebrush heights are important. Sage grouse use has been recorded on the northern third of the Reserve during the winter. Due to the migratory nature of this population, it is likely that these individuals move onto the Reserve from elsewhere. Sage grouse select winter use sites based on snow depth, and topography and snowfall can affect the amount and height of sagebrush available to grouse (Connelly, 1982).

3.8 Wildfire

With one exception, there is no evidence of significant recent rangeland fires on the Reserve. Large fires have occurred on the INEEL further south, but the Reserve has been spared over the past 50 years. The reasons behind this are speculative, but possibilities include: (1) low occurrence of lightning strikes due to prevailing weather patterns, (2) relatively limited extent of cheatgrass, (3) areas with low fuel loading, especially on the southwest (windward side) of the Reserve, and (4) fuel reduction through livestock grazing. The possibility of future fires on the Reserve is very high.

Coincident with Euro-American settlement and heavy livestock grazing in the late 1800s, cheatgrass became well established throughout the Intermountain Region (Pyke and Novak, 1994). While this invasive winter annual has spread rapidly in areas with high levels of human activity, the INEEL has generally been spared. Elsewhere in the region, the presence of cheatgrass has had a major effect on fire regimes. Cheatgrass begins growth in very early spring, produces seed, and dries out by late May or June. The dried cheatgrass then remains available as a very flammable fine fuel through the heat of the summer fire season. This increases the chance that fire will start and that fires will burn larger areas once started. The resulting increased fire frequencies have the double effect of benefiting cheatgrass and killing native perennial species. Thus a positive feedback loop is created that converts native communities to annual cheatgrass rangelands with permanently increased fire frequencies (Peters and Bunting, 1994). Fire return intervals as low as three to five years have been noted in the Snake River Plain (Young and Evans, 1978; Wright and Bailey, 1982). Minimizing the spread of cheatgrass on the Reserve is crucial to maintaining the sagebrush steppe plant communities. Even though cheatgrass is found on much of the INEEL, its abundance is currently limited to isolated patches in areas where the soil has been repeatedly disturbed and native perennial plants reduced. On the Reserve these conditions are found along the de-watered channel of Birch Creek, other livestock concentration areas and along roads.

3.9 Water Resources

The Reserve receives surface water from two tributary basins, the Big Lost River and Birch Creek Valley, and groundwater from the Birch Creek Valley aquifer (#62), Little Lost River Valley aquifer (#64), and the eastern Snake River Plain regional aquifer (#39).

Birch Creek surface water and ground water flows enter the reserve from the north and sink into the Eastern Snake River Plain aquifer along the northern margins of the reserve. Beginning in the early 1900s the entire flow was diverted for irrigation into the Reno Ditch, approximately 3 miles above the Reserve boundary. Although water was allowed to flow in the original channel during the winter, flows

reached the Birch Creek Sinks only during exceptionally high runoff events. Approximately 3500 acre-feet of water accumulated in the Birch Creek playa during 1969 (Koslow, 1984). Since 1986, Birch Creek has been diverted above the Reno Ditch for irrigation and power generation. This has de-watered approximately 15 miles of historic Birch Creek riparian habitat, including approximately 10 miles on the Reserve. The diversion provides Birch Creek Power with 50 to 60 cubic feet per second for its 2,700 KW plant near Reno Point. The power plant produces an average of 14 million KW-Hrs annually with the water outflow being used for irrigation during the summer (BLM Case-file I-19684, Birch Creek Power). From approximately September through April, the outflows of the power plant are discharged back to the INEEL via a ditch where the water flows into the T-28 North Gravel Pit. Sediments in the water are sealing the canal bottom and gradually filling the pit. The decreased capacity of the pit, combined with ice buildup during cold weather, is causing increasing flows to overtop the pit and increasing flooding potential of TAN.

The Birch Creek, Big Lost River and Little Lost River valleys all contain unconsolidated alluvial materials and porous sedimentary rocks up to a few thousand feet thick (Crosthwaite et al., 1970). These materials overlie relatively impermeable volcanic rocks and provide a porous conduit for the valley aquifer systems. While most of the water in each watershed originates in the adjacent mountains, the numerous tributaries and valley bottom streams lose most of their flow via seepage into the ground water before reaching the Reserve, except during heavy runoff events. Heavy surface flows have been recorded onto the Reserve from both Birch Creek and the Big Lost River.

Ground water depths beneath the Reserve vary from about 200 to 600 feet. The depth to ground water at TAN varies from 200 to over 350 feet (Lewis et al., 1996). Past activities at the INEEL have affected the ground water quality at several sites. Before the mid-1980s, waste discharged to unlined ponds and injection wells introduced radionuclides, heavy metals, inorganic salts and organic compounds to the aquifer. With the exception of Test Area North, all of the facilities at the INEEL are down gradient from the Reserve. At Test Area North, detectable levels of radionuclides and volatile organic compounds have been found in monitoring wells. A number of these wells are on the Reserve. Detected compounds include trichloroethylene, tetrachloroethylene, 1,2-dichloroethylene, and the radionuclides tritium, strontium-90, cesium-137, and uranium-234. In addition, the surface and subsurface contaminants Cobalt-60, strontium-90, barium, cadmium, chromium, mercury, silver, benzene, toluene, ethyl-benzene, and xylene are present at Test Area North (Lewis et al., 1996). Extensive cleanup projects are underway to remediate the ground water and none of the contaminants discharge to or come in contact with the land surface or the biotic components of the Reserve.

3.10 Soil Resources

The soils on the Reserve fall into three soil orders: Entisols, Aridisols and Mollisols as defined by soil taxonomy (USDA, 1999; Olson et al., 1995). The least developed soils, those with minimal plant production, fall into the Entisol Order (Suborder names "...ent"). These are generally on the Lake Terreton sediments where the combination of dry sites, high clay content and unstable sand dunes limit soil development. On other dry, but more stable sites, slight soil surface horizon development moves the classifications into the Aridisols Order (Suborder names "...ids"). Organic matter production is minimal in these areas, but soil surfaces are more stable, allowing for increased darkening of the surface horizons. These soils are found on the basalt flows and most of the Birch Creek alluvial deposits. The most productive soils on the Reserve are Mollisols (Suborder names "...olls"). These are found in more moist landscape positions in the Lemhi Mountains and along the Birch Creek channel. Increased soil moisture allows for more plant production and increased organic matter enrichment of the soils. This results in surface soil horizons that are the thickest and darkest on the Reserve.

3.11 Air Resources

The area surrounding the Reserve is classified as a Prevention of Significant Deterioration (PSD)-Class II Area, designated under the Clean Air Act as an area with reasonable or moderately good air quality while still allowing moderate industrial growth. About 12 miles west of the INEEL is Craters of the Moon National Monument and Wilderness Area, classified as a PSD Class I Area. Planned activities on the Reserve must not negatively impact the air quality in this Class I Area.

3.12 Cultural Resources

Cultural resources are sites, structures, landscapes, and objects of some importance to a culture or community for traditional, historic, religious, scientific, or popular reasons. Historic sites are generally at least 50 years old, but there are younger exceptions. Prehistoric sites and artifacts are aboriginal in nature and predate Euro-American contact (about 1800 in Idaho). Paleontological sites and artifacts are fossils that may be contemporary with or predate human occupation. While approximately 4% of the INEEL has been surveyed for cultural materials, more than 1,500 sites have been identified (Ringe, 1993). Based upon this sampling, the INEEL, and by inference the Reserve contains a large number of cultural resources. Public access restrictions have helped to preserve this unique record of human use in this important area.

The unique natural resources of the Reserve have been attractive to human populations for at least 12,000 years. Crumbling basalt foundations and cisterns left by farmers and ranchers, broken pottery shards, and stone tools left by many generations of hunter-gatherers, as well as ongoing visits by their descendants all speak to the wealth of cultural resources found there. Early inhabitants were undoubtedly attracted by the plant and animal resources offered by the Big Lost River, Birch Creek, their associated Sink areas and the shallow waters of Pleistocene Lake Terreton (Anderson et al., 1996). Campsites as old as 7,000 years occur in association with the wetlands, stream corridors, edges of ancient lava flows and around low hills like Richard's and Cinder Buttes (Ringe, 1993).

More than 100 years ago, Euro-American pioneers were also quick to recognize the wealth of resources offered by the area. Several main stage and wagon roads, and old foundations mark the location of at least one turn of the century stage station. Abandoned homesteads are also common along the Sinks and stream channels, some associated with families that rose to local prominence such as the Renos and Bartels. Early miners, ranchers and homesteaders brought in large numbers of horses, sheep and cattle to grazing on open range.

3.13 Native American Tribal Values

Prior to the arrival of Europeans, the region was populated by the Shoshone and Bannock Tribes (Tribes). These now compose one Federally recognized tribe that includes two distinct groups: the Northern or Snake River Shoshone and the Bannocks. The four Northern Shoshone Band divisions include the Western Shoshone (Warraeekas), the Mountain Lemhi Shoshone (Tukueukas and the Agidikas), the Northwestern Shoshone, and the Fort Hall Shoshone (Pohogue) (Hunn, 1990; Shallat and Burke, 1994).

The Reserve area has been used by the tribes for a wide variety of culturally important uses including hunting, gathering, residential, and as travel routes to both the Camas Prairie and the Salmon River. Many species of plants and animals of significant importance to the Tribes are found there. Tribal members hunt or gather many animal and plant species for subsistence and ceremonial purposes from sagebrush ecosystems. This includes elk, deer, marmots, sagebrush, bitterroot, sweet sage, and biscuit-

root. Along with the living environment, the Tribes also value traditional cultural properties such as vistas, landmarks, and areas of high concentrations of culturally significant artifacts. Preservation and protection of these is important for carrying on cultural traditions for future generations and ensuring that members have continued access is vitally important for continuation of Tribal culture. The Tribes are a historic culture that continues to exist.

3.14 Social and Economic Resources

The social and economic implications of public land management are of interest to local residents and to people throughout the United States. Residents of the local Counties are most likely to experience any direct social and economic impacts of the Reserve Management Plan. Due to limited public access to the Reserve, grazing permittees, right-of-way owners, academic researchers and big game hunters are the most likely to be affected.

The Reserve is within Butte, Clark and Jefferson Counties. The economies and cultures of each of these are traditional western agriculture and ranching. Local economic benefit derived from the Reserve is almost totally livestock grazing with a minor component of income obtained from big game hunting. In addition, a few INEEL employees reside in each of the local communities.

Table 5. Population, employment and demographics.

	Butte Co.	Clark Co.	Jefferson Co.	Idaho	USA
Total Population	2,899	1,022	19,155	1,293,953	281,421,906
Persons/square mile	1.3	0.6	17.5	15.6	79.6
Ag/Forestry/Fishing/ Mining Employment	17.5%	34.4%	12.1%	5.8%	1.9%
Change in non-farm employment (1990–2000)	+85.3%	+230%	+54.9%	+44.7%	+18.4%
White	94.7%	74.2%	90.0%	91%	75.1%
Black	0.3%	0.1%	0.3%	0.4%	12.3%
American Indian	0.7%	1.0%	0.5%	1.4%	0.9%
Asian	0.2%	0.2%	0.2%	0.9%	3.6%
“Other” race	2.4%	23.5%	6.8%	4.2%	5.5%
Hispanic or Latino (of any race)	4.1%	34.2%	10%	7.9%	12.5%
65 and over	14.9%	9.2%	9.3%	11.3%	12.4%
Persons below poverty level	18.2%	19.9%		11.8%	12.4%
Families below poverty level	14.7%	18.7%		8.3%	

(U.S. Census Bureau, 2002)

3.14.1 Economics of Livestock Grazing

All of the cattle on the Reserve are from ranches in Butte County and the sheep herds come from Clark, Jefferson and Bingham Counties.

Table 6. Reserve use by local livestock industry.

County	Total Beef and Dairy Cattle and Calves ^a	Total Sheep and Lambs ^a	Approximate Numbers Grazing on Reserve
Butte Co.	20,000	9,000	545 cattle
Clark Co.	14,000	6,500	468 sheep
Jefferson Co.	66,000	15,500	2500 sheep
Bingham Co.	80,500	13,500	79 sheep

a. (IASS, 2002)

While the total numbers of cattle and sheep on the Reserve is small relative to the County totals, many researchers have shown that impacts to local economies are greater than the direct economic values derived from grazing on Federal allotments (Van Tassell and Richardson, 1998 and others). Taylor (2002) attached an economic output per AUM of \$60.56 for cattle and \$39.67 for sheep grazing on Federal leases in Uinta County Wyoming. This includes direct profits by producers and multipliers for their expenditures within the economy. In addition, each cattle AUM resulted in 0.000774 local jobs and each sheep AUM supported 0.000938 jobs. Using these numbers, the grazing on the Reserve provides the following values to local economies.

3.14.2 Economics of Federal Leases

Federal leases for grazing and utility ROWs on the Reserve generate annual income for the Federal Treasury. Leases for the Reserve portions of the four Federal allotments are shown in Table 7. The Reserve portion of the 230 KV Utah Power and Light power line and the two buried fiber-optic lines rent for a total of approximately \$3,718.68 (BLM files). The INEEL power lines and the State highways pay no rental fees on Federal land.

Table 7. Economic value of livestock grazing on reserve.

	Wigwam Butte (Cattle)	Sinks (Cattle)	Twin Buttes (Sheep)	Mahogany Butte (Sheep)	Totals
Active AUMs	642	253	263	471	1629
Annual Federal receipts	\$808.92	\$318.78	\$331.38	\$593.46	\$2,052.54
Value added to economy	\$38,879	\$15,321	\$10,433	\$18,684	\$83,317
Jobs created	0.50	0.20	0.25	0.44	1.39

3.14.3 Economics of Big Game Hunting

The portions of the Reserve open to public hunting provide an unknown number of hunter days that are valued at \$44.12 each (ASA 1996). Depredation on adjacent farmlands, mostly by elk, is also a significant economic factor. With summer populations on the INEEL ranging from 142 to 500 animals (IDF&G Records), crop losses can be large.

3.15 Environmental Justice

Environmental Justice considers equity and fairness in resource decision-making. Federal law requires that all Federal actions consider potentially disproportionate effects on minority or low-income communities. Potential impacts or changes to low-income or minority community in the project area due to the proposed action must be considered.

Table 5 highlights demographic statistics for the Idaho counties of concern from the 2000 census. Within the counties included by the Reserve, only the Hispanic population in Clark County (34.2%) represents a minority population potentially affected disproportionately by the Reserve Plan. However, the small proportion of Clark County contained within the Reserve and the nature of proposed management actions would have very little effect. Specific actions to address environmental justice concerns were not implemented for this project. No disproportionately negative impacts to low-income or minority community are expected under any alternative.